CHANGING WHAT'S POSSIBLE

OPEN+ Concrete Cohort

PROJECT DESCRIPTIONS

Neuvokas Corporation – Ahmeek, MI

Energy Efficient, Incrementally Scalable, Continuous Basalt Fiber Filament-forming Extrusion Bushing –$2,000,000

Neuvokas Corporation will develop an energy-efficient continuous basalt fiber (CBF) manufacturing process. The project will focus on the filament-forming extrusion bushing. The final deliverable will be a filament-forming extrusion bushing capable of supporting the production of low-cost, high-quality CBF at scale. Using CBF instead of steel to reinforce concrete can reduce capital expenses, greenhouse gases, and operating expenses, and increase concrete service life and time to major maintenance by more than 30 years, saving greater than 0.5 quad (146,535,500,000 kWh) of energy per year.

Rutgers University – New Brunswick, NJ

Microbial Curing of Cement for Energy Applications –$2,932,154

Rutgers University, Lawrence Livermore National Laboratory, and the University of Arizona, will develop a new manufacturing process for carbonate cement concrete (C3), an alternative to traditional ordinary Portland cement (OPC) concrete. C3 utilizes carbon dioxide instead of water to solidify the material. C3 now relies on externally-introduced carbon dioxide for solidification. This program will use microbes within the microstructure to produce carbon dioxide internally for solidification. Microbial-cured C3 is expected to last longer than OPCC, which will reduce the need for concrete repair and replacement. This in turn reduces energy consumption, carbon dioxide emissions and costs associated with concrete-based projects. Techno-economic and lifecycle analyses will quantify these benefits.

University of Virginia – Charlottesville, VA

Carbonation-Enabled Mineralization to Engender Novel Technology – $1,186,934

The University of Virginia, in collaboration with C-Crete Technologies, is developing a new approach to making cement using the calcium silicate mineral pseudowollastonite. When pseudowollastonite is exposed to moderate heat and alkaline conditions with carbon dioxide and water, it reacts to form mineral phases that are much stronger and more stable than commercial cements. This project's objectives are to identify inexpensive mineral feedstocks and industrial waste materials (e.g., flue gas from coal-fired power production, fly ash, and slag from municipal solid waste incineration) to produce pseudowollastonite-based cements at scale, and optimize its reaction and curing conditions to result in strong, durable pre-cast structures. These materials would require only a small fraction of the energy used to produce conventional cements.